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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/435,766	11/08/1999	TOMOYOSHI KUSHIDA	104361	5662

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EXAMINER

LOKE, STEVEN HO YIN

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 12/10/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/435,766

Applicant(s)

KUSHIDA, TOMOYOSHI

Examiner

Steven Loke

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 03 October 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1, 4, 12 and 20-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1, 4, 20 and 21 is/are allowed.
- 6) ☒ Claim(s) 12 and 22-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

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1. Claims 12 and 22-29 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Fig. 10B discloses a p- type channel [215] formed between the gate electrode [218] and between the n-type drift region [214] and the source region [220]. The specification never discloses an impurity concentration of the channel region is equal to an impurity concentration in the drift region, and a depletion layer forms over the entire channel region sandwiched between the gate region when a zero bias is applied to the gate region as claimed in claim 12.

The specification never discloses the embodiment of fig. 10B includes at least a part of the source electrode forms a Schottky junction with the channel region as claimed in claims 24 and 25.

The specification never discloses the embodiment of fig. 10B includes a semiconductor layer having the first conductivity type located between the source region and the source electrode, and the semiconductor layer including an end face extended to a position covering at least a portion of the gate region as claimed in claim 26.

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

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only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 12 and 22 insofar, as in compliance with 35 USC 112, are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Williams et al. (U.S. Patent No. 5,998,834).

In regards to claim 12, Williams et al. show all the elements of the claimed invention in figs. 10 and 11. It is a semiconductor device, comprising: a substrate [101] having a first conductive type (N++); a drift region [102] having the first conductive type (N+) and disposed on the substrate; a channel region [107] having a second conductive type (P) different from the first conductive type and provided on the drift region; a gate region [103] provided so as to surround at least the channel region via an insulation film [105]; and a source region [106] having the first conductive type and provided on the channel region, a portion of the source region is located substantially at a center of the channel region, wherein an impurity concentration (P) of the channel region is less than an impurity concentration (N+) in the drift region, and a depletion layer forms over the entire channel region sandwiched between the gate region when the gate-to-source voltage is zero (col. 5, lines 62-67, col. 7, lines 1-27). Since the gate-to-source voltage is zero voltage, it is inherent that the voltage applied to the gate region is also zero voltage because the source region of an n-channel enhancement type field effect transistor is always connected to zero volt.

In regards to claim 22, Williams et al. further disclose the gate region has the first conductive type (N).

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4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Williams et al. (U.S. Patent No. 5,998,834).

In regards to claim 23, Williams et al. differ from the claimed invention by not showing a source electrode provided on the source region. It would have been obvious for a source electrode provided on the source region because it provides external connection between the source region and the external circuit.

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claim 30 is rejected under 35 U.S.C. 102(b) as being clearly anticipated by Williams et al. (U.S. Patent No. 5,661,322).

In regards to claim 30, Williams et al. show all the elements of the claimed invention in figs. 1, 2A and 15B. It is a semiconductor device, comprising: a substrate [14] having a first conductive type (N+); a drift region (an upper portion of layer [13]) having the first conductive type (N-) and disposed on the substrate; a channel region (a lower portion of layer [13]) having the first conductive type (N-) and provided on the drift region; and a gate region [11] provided so as to surround at least the channel region via an insulation

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film; wherein an impurity concentration (N-) of the channel region is equal to an impurity concentration (N-) in the drift region, and a depletion layer forms over the entire channel region sandwiched between the gate region when a zero bias is applied to the gate region.

8. Applicant's arguments filed 10/3/02 have been fully considered but they are not persuasive.

It is urged, in page 3 of the remarks, that the specification discloses the impurity concentration contained in the p-channel (115) is set equal to or less than the impurity concentration in the n drift region (114) and the elements forming the third embodiment are similar to the elements consisting the second embodiment. However, the specification only discloses elements 210, 212, 214, 216 and 220 of the third embodiment (figs. 10A and 10B) are similar to elements 110, 112, 114, 116 and 120 of the second embodiment (figs. 9A and 9B), respectively. The specification is silent to any similarity between the impurity concentration of the channel region [215] of the third embodiment (fig. 10B) and the impurity concentration of the channel region [115] of the second embodiment (fig. 9B). The specification never discloses the impurity concentration contained in the p-channel [215] is equal to the impurity concentration in the drift region [214] in the third embodiment (fig. 10B).

9. Claims 1, 4, 20 and 21 are allowed.

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

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§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven Loke whose telephone number is (703) 308-4920. The examiner can normally be reached on 7:50 am to 5:20 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

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December 4, 2002

*Steven Koke*